
Network Attendant Service

Network Attendant Service (NAS) provides stand-alone attendant capabilities throughout a network. Any node in the network may have its attendant services located at any other node in the network, part-time or full-time.

Functionality

The activation of Network Attendant Service is controlled by the NAS key on the Attendant Console. When a call is presented to an attendant and the NAS key is not activated, the call receives normal attendant service. If the NAS key is activated, the call receives alternate treatment, based on one of the NAS conditions described below.

Network Attendant Service schedule

The NAS schedule allows a prioritized list of attendant alternatives (attendant locations) to be defined for up to 31 half-hour time periods. Each period can have up to four alternate attendants defined against it. During one of these time periods, a request for attendant service will use one of the alternatives, according to the specified order - the first attendant alternate is attempted, and if all attendants are in Position Busy, the following alternate in the sequence is attempted, and so on.

If none of the attendant alternatives are available, an attempt is made to give local attendant service, which may lead to the application of local NIGHT service.

Night Service

Night Service treatment is defined individually for each node.

With the introduction of NAS routing, identifying whether or not a system is in Night Service becomes more complex. Table 65 shows when Night Service treatment is in effect. When all the conditions in a vertical column are met, the system is considered to be in Night Service.

Table 65
Determination of Night Service

Local Attendants exist	No	No	No	Yes	Yes	Yes
Local Night active				Yes	Yes	Yes
NAS key active	No	Yes	Yes	No	Yes	Yes
No alternatives in current NAS schedule		Yes			Yes	
All alternatives in current NAS schedule tried			Yes			Yes

Status of local attendants

When NAS routing is active and there is an available attendant at the local switch, the call terminates at the local attendant, if one is available. If a local attendant is not available, the call may either be placed in the local attendant queue (if the Call Waiting threshold has not been exceeded and the console Call Waiting lamp is not flashing), or may receive local NIGHT service.

Alternate routing to attendant positions

Calls can be routed from one attendant to another attendant location in the network. Each node can be programmed with the attendant DNs for up to seven other switches. Up to four of these seven attendant DNs can be used as alternatives for any one time period. Each of the four attendant alternatives for each time period can have Drop Back Busy and/or Off-hook Queuing options configured.

If a call is to be routed to an alternate attendant at another node and all trunks to the other node are busy, the call is queued for an available route to the alternate (if the alternate has the Off-hook Queuing feature). The call remains queued for a specified time, which, upon expiring, causes the call to be directed to the next alternate attendant.

The operation of NAS routing, as controlled by the activation of the NAS key, is summarized in Table 66.

Table 66
NAS Routing Possibilities

	NAS Key	Home Attendant	Night Key	CW Lamp	Trunks to Remote	Action
1	Dark	All Busy	Dark	X	X	Queue to Home Attendant
2	Dark	Not Busy	Dark	Dark	X	Select Home Attendant
3	Dark	X	Lit	X	X	Route to Home Night
4	Lit	Not Busy	Dark	Dark	X	Select Home Attendant
5	Lit	All Busy	Dark	No Flash	X	Queue to Home Attendant
6	Lit	All Busy	Dark	Flash	Not Busy	Route to Remote Attendant
7	Lit	All Busy	Dark	Flash	All Busy	Queue to Home Attendant
8	Lit	X	Lit	X	Not Busy	Route to Remote Attendant
9	Lit	X	Lit	X	All Busy	Queue to route

Drop Back Busy

When a call reaches a Remote node, no attendant is available, and NAS routing or Night Service at that switch is about to be performed (if the Drop-back busy option was set at the originating switch and sent with the call), the call is treated by the originating switch as though no attendant is available at the Remote switch. Another alternative is selected from the originating switch.

Note: Drop Back Busy (DBB) and Remote Virtual Queuing (RVQ) are both packaged under the Originating Routing Control/Remote Virtual Queuing (ORC-RVQ) package 192. If RVQ and DBB are both configured, DBB will take precedence over RVQ. If the user wishes to activate RVQ, DBB must be disabled for a route entry in response to the IDBB prompt. If the user wishes to activate DBB, it must be enabled by entering DBI or DBA.

Attendant Off-hook Queuing

During peak periods, a call may be prevented from reaching a remote attendant if all possible routes to that attendant are busy. If these routes have off-hook queuing, the call will queue on these routes. If activated in the NAS programming and on the route list for the call, queuing occurs before the system attempts other alternatives. The alternatives are tried after the Off-hook Queuing (OHQ) timer expires.

Network Attendant Service capabilities

The following sections describe the network capabilities that are offered as part of NAS.

Break-in

The Break-in feature allows an attendant to enter an established call anywhere in the network and to offer another call or important message to one of the parties involved in the call. Break-in is provided as a key (BKI) function. The BKI key can be pressed before dialing the DN of the required station (pre-dial) or after (post-dial).

When the BKI key is pressed, the following situations may exist:

- **Break-in request recognized** — this is a temporary processing state, that occurs when an attendant tries to break-in to a party at another node, and lasts until the signaling protocol for the break-in attempt is completed.
- **Break-in ignored** — this state occurs if the required party has disconnected at the point of break-in, is idle without the Make Set Busy or Do Not Disturb features active, or is idle with the Call Forward feature active. In all cases, the party is rung, and the attendant can extend the call.
- **Break-in allowed** — the attendant can break into the required party, consult with the required party, and extend another call to the party if (a) the source is an external call, (b) Camp-on is available on the required party, and (c) the established call is a basic call.
- **Break-in denied** — break-in is not allowed if any of the above conditions are not met.

- **Break-in temporarily denied** — the attendant temporarily cannot break-in to the required party, but can try again later. This situation occurs if:
 - the required party is dialing, involved in a consultation call, or is on hold
 - the required party's set is ringing or receiving an indication tone
 - the required party's set is connected to a paging, dictation, recorded announcement, or integrated voice messaging trunk
 - the party to be extended is a local party or trunk with warning tone denied Class of Service
 - network blocking to a remote node has been encountered
- **Break-in consult only** — the attendant can break into the required party, and can consult with the party but cannot extend another call. This situation occurs if:
 - the attendant originates the call
 - the source is an internal call
 - the source is an external call and neither Camp-on nor Call Waiting is possible on the required party
 - the attendant attempts a pre-dial break-in and the required party is busy with Call Forward active.

Call extension

Restrictions that apply to attendants at local nodes also apply to calls extended across the network to remote node attendants.

Attendant control prevents the calling set from disconnecting until the attendant releases. Once the attendant releases or extends and releases the call, attendant control is relinquished.

Timed reminder recalls

Timed reminder recalls are attendant-extended calls that return to the attendant when their timers expire. The timers apply to slow answer calls, camped on calls, and call waiting calls.

When the attendant extends the call to a party at another node, the trunks between the attendant and the source and the attendant and the destination are not taken down after the Release key is pressed. This is true even if tromboning has occurred. This allows the attendant node to monitor the outgoing trunk for an answer signal. If no answer signal occurs within the specified time, the call is presented again to an attendant (or to the original attendant, if Recall to Same Attendant is active on the attendant node).

Anti-tromboning is only invoked after the destination has answered and the attendant has released from the call.

Incoming Call Indication

The Incoming Call Indicators (ICI) will operate in the same manner as a stand-alone Meridian 1 for incoming calls from stations or trunks.

New ICI types are introduced for NAS routed calls for each trunk type. The indicators can be the following:

- a dial 0 call (ordinary or fully restricted)
- a recall request
- a line lockout intercept
- Call Redirection (Call Forward No Answer, Call Forward Busy)
- an interpositional call
- a Listed Directory Number (LDN)
- a Message Center call
- NAS trunk types (type of trunk on which the call came into the originating switch. The choices are: NDID, NCO, NTIE, NFEX, and NWAT)

Attendant Display

Three features which pass information useful for attendant display are:

- Calling Line Identification (CLID)
- Network Call Party Name Display
- Network Call Redirection

For incoming calls, the CLID received (if available), is displayed instead of the Trunk Route Access Code and Trunk Member Number. If the call comes from the private ISDN network and there is a name associated with the calling telephone, the name is displayed on consoles with alphanumeric displays.

Reason for redirection codes are displayed if the call has been redirected by a feature such as Call Forward All Calls.

Camp-on and Call Waiting

Both Camp-on and Call Waiting allow calls extended to a busy set a further opportunity to reach that set. If the call is extended across the network to a busy set, Camp-on or Call Waiting may be attempted in the same manner as in the stand-alone case.

Tenant Service

If Multi-Tenant (TENS) software package 86 is equipped, the table number in the NAS overlay programming can be referenced to an individual Console Presentation Group. Each tenant can have its own individual NAS routing programmed.

Centralized Attendant Service vs. Network Attendant Service

NAS has some similarities to a previous non-ISDN application called Centralized Attendant Service (CAS). There are significant differences as well.

Centralized Attendant Service

- Allows attendants to be centralized at one Main switch connected to Remote switches with Release Link Trunks (RLTs).
- When a remote switch has the CAS feature key activated, incoming calls to the Remote switch are redirected to the Main switch where an attendant answers the call.
- The call comes into the Main switch on an RLT. The attendant can extend the call back to a telephone at the Remote switch. The call is routed on the same RLT trunk which was used when the call came into the Main switch.
- Once the call is ringing at the telephone, the RLT trunk is released.
- If the telephone goes unanswered, the call recalls to the attendant at the Main switch. A Release Link Trunk is used for the recall.
- The CAS feature is activated using a key on a proprietary telephone or console at the Remote switch.
- When users at different switches call each other or the attendant places a call to another switch, normal TIE trunks are used.

Network Attendant Service

- NAS allows several switches to have attendants who answer calls which have been redirected by the NAS feature. The switches are connected with Primary Rate Interface (PRI) or ISDN Signaling Link (ISL) connections.
- NAS routing allows a call destined for the local attendant to be diverted to a Remote attendant. This routing is governed by a NAS schedule, a NAS key, or a permanent NAS Active setting which can be programmed.

- NAS calls can result in tromboned trunk connections between the Remote switch and the Attendant switch. These connections remain until the ringing telephone answers the call. This can result in two tromboned TIE trunks or channels being held up while a telephone is ringing.
- If anti-tromboning has been programmed, the tromboning is corrected after the telephone is answered.
- If the telephone goes unanswered, the call recalls to the attendant at the Main switch. A PRI channel or ISL trunk is used for the recall.
- A NAS key may be optionally programmed on an Attendant Console.
- NAS calls and normal user calls all use the same PRI/ISL trunks.

There are three additional differences between NAS and CAS:

- NAS routing is used when calls waiting in the local attendant queue exceed one of two thresholds. CAS routes all calls to the Main CAS switch.
- NAS chooses an attendant from up to four alternatives per time period. With CAS, each Remote site has only one Main switch to which to route calls.
- NAS routing can also be based on the status of trunks to other nodes and Night Service indicator status. These factors do not affect call routing with CAS.

Operating parameters

NAS and the Centralized Answering Position (CAP) capability are mutually exclusive. A Meridian 1 system may not have an actual attendant console. Instead, the system may be configured to use a Centralized Answering Position (typically, using a Meridian 2616 digital set.) The CAP Directory Number (DN) is the customer Night DN. Since no attendant is configured, the customer is viewed to be in Night Service and any calls for the attendant are directed to the CAP.

An attendant answering position must be an attendant console, and not a Meridian digital set.

NAS and Attendant Overflow Position packages are mutually exclusive and may not be packaged together.

Trunk Group Busy applies only to trunk groups on the node where the attendant resides.

The Uninterrupted Line Connection feature continues to work on a stand-alone switch basis; however, Network-wide Break-in, based on warning tone Class of Service, cannot be guaranteed. Only one Attendant at a time is allowed to break into a connection. Break-in is allowed for telephones only, not trunks or other attendants. Attendant Control is not provided if the connection is a result of a Network Break-in.

Unsupported features

NAS does not support:

- Supervisory Console
- Call Park
- Charge Account
- Do-Not-Disturb and Group Do-Not-Disturb.

The following functions and features are not supported across the network:

- Barge-in
- Busy Verify
- Emergency transfer.

Feature interactions

Attendant Interposition Call

An attendant is not able to call a specific attendant on another node by dialing the attendant DN followed by the attendant number. The attendant dials the Network Alternate Route Selection (NARS), Coordinated Dialing Plan (CDP), or Listed Directory Number (LDN) the same way a telephone dials to reach the attendants at another node.

Busy Verify

Pre-dial Break-in provides equivalent functionality but has several advantages over Busy Verify. Busy Verify does not operate on a network-wide basis.

Call Forward, Break-In and Hunt Internal or External Network Wide

When a call is transferred, a new facility message is sent to the transferred party's node to transport the terminal indicator parameter or the access trunk information parameter.

DPNSS1 Route Optimisation/MCDN Trunk Anti-Tromboning Interworking

If tromboning trunks are removed on the MCDN side of a RO/TAT Interworking gateway scenario by the Network Attendant Service feature (since NAS has presence over TAT), the RO/TAT Interworking functionality is not invoked. The result is that, if NAS is equipped, attendant-extended calls that are in a tromboning state are optimised on the MCDN side, but DPNSS1 trunks are not optimised on the DPNSS1 side of the RO/TAT Interworking gateway scenario.

EuroISDN Master Mode

NAS signaling is not supported on a EuroISDN Master Mode connectivity. However, NAS will interwork with an incoming call from the EuroISDN Master Mode (routing and call handling).

INIT ACD Queue Call Restore

Call information associated with Network Attendant Service is lost after system initialization and call restoration.

ISDN QSIG Basic Call

ISDN QSIG Basic Call interacts with Network Attendant Services (NAS) as if the call is going to a route without NAS being equipped.

Listed Directory Numbers, Network-wide

This feature enables LDNs to be recognized network- wide when NAS is used. Up to six LDNs can be defined per Meridian 1. The same LDNs must be configured in multiple nodes. The LDN which users dial can be programmed as a CDP number, for example, and input in the NAS overlay as the ID of remote attendants.

Recall to Same Attendant

This feature operates on a network-wide basis for the following call types:

- Slow Answer Recall
- Camp-on Recall, and
- Call Waiting Recall.

The operation of this feature is affected by the programming for the option in the Customer Data Block of the system where the attendant answering the call resides.

Feature packaging

The following packages are required for NAS:

NAS requires the following packages:

- Network Attendant Services (NAS) package 159;
- Advanced ISDN Network Services (NTWK) package 148;
- Network Automatic Routing System (NARS) package 58 or Coordinated Dialing Plan (CDP) package 59;
- Network Class of Service (NCOS) package 32;
- Basic Routing (BRTE) package 14;
- Attendant Break-In/Trunk Offer (BKI) package 127;
- Basic Queuing (BQUE) package 28;
- Flexible Call Back Queuing (FCBQ) package 61;
- Originating Routing Control/Remote Virtual Queuing (ORC-RVQ) package 192 for Drop Back Busy (please see note under “Drop Back Busy” description);
- Integrated Services Digital Network (ISDN) package 145;
- ISDN Supplementary Features (ISDNS) package 161; and
- 1.5 Mbps Primary Rate Access (PRA) package 146 or ISDN Signaling Link (ISL) package 147.

Feature administration

Configure NAS operation by making changes in LD 12, LD 15, LD 17, and LD 86. Optional functionalities are provided by making changes in LD 93, and LD 16.

LD 12 – Configure Attendant Consoles with NAS keys.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	ATT 1250 2250	Type of console
TN	l s c u	Terminal Number.
	c u	For Option 11.
KEY	xx NAS	xx is the key number assigned the NAS function. Each Attendant Console can have only one NAS key defined. This key is optional.

LD 15 – Enable or disable network attendant control, Recall to Same Attendant, NAS routing, and define a TRK ICI key.

Prompt	Response	Description
REQ	CHG	Change existing data block.
TYPE	CDB NET	Customer Data Block. Networking Data. Release 21 gate opener.
CUST	xx	Customer number.
- OPT	aaa	Options.
- AC2	aaa	Access Code 2 as defined in LD 86.
- ISDN	YES	Integrated Services Digital Network
...		
- NAS	(YES) NO	Specifies whether to (allow) or deny attendant control for call extension.
- NAS_ ACTV	(NO) YES	Specifies whether to allow or (deny) NAS routing.

- NAS_ ATCL	(YES) NO	Specifies whether to allow (YES) or deny attendant control for call extension.
- NAS_ ACTV	(NO) YES	Specifies whether to allow or (deny) NAS routing.
...		
- ICI	xx NCO NDID NTIE NFEX NWAT	Respond with the key number, from 0 to 19, followed by a space, followed by the trunk type. Network CO trunk Network DID trunk Network TIE trunk Network FEX trunk Network WAT trunk
- RTSA	(RSAD) RSAA RSAX	Recall to Same Attendant Denied Recall to Same Attendant Allowed Recall to Same Attendant allowed, with queuing on busy attendant.

LD 17 – Configure the D-channel interface (DCHI) for NAS.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	ADAN	Action Device and Number.
DCHI	xxx	Respond with DCHI number for which NAS signaling is to be allowed or restricted.
NASA	YES (NO)	Specifies whether DCHI is to be allowed or (denied) NAS signaling.

LD 86 – Configure NAS routing.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
CUST	xx	Customer number.
...		
FEAT	NAS	Specifies type of data to be changed.
TBL	0–63	Routing table number, from 0 to 63. Without Multi-Tenant Service, 0 is the customer routing table. With Multi-Tenant Service enabled, NAS tables 1-63 may be associated with CPGs 1-63.
ALT	1–7	An alternative attendant or routing table, from 1 to 7. (To clear an old number, type an X before typing the new number. The old number cannot be cleared if it is associated with a schedule period. Reach TODS by pressing the return key.)
ID	xxxxxxxxxxxxxxxx	The dialed digits (including the network access code) needed to reach an attendant associated with the alternative number. Respond with a string of up to 16 digits to change the attendant ID; press the return key to leave the ID unchanged, exit the prompt, and return to ALT.
TODS	0–31	Specifies a schedule period, from 0 to 31, where 0 is the default to handle all time periods not defined in 1 through 31. Type an X before a period number to remove the schedule period. (Typing an X before a 0 clears all associated alternatives, leaving the default treatment as local attendant treatment.) Press the return key to continue the NAS feature setup process.
- PER	HR:MIN HR:MIN	Specifies the start and stop times for the period using 24-hour format. Start time must be before the stop time, and minutes can be only 00 or 30. Press the return key to leave times unchanged and move to the DAYS prompt.

- DAYS	D, D, ... D	Specifies applicable days of the week for the time period. Respond by inputting a number representing each day for which the schedule is active (where 1=Monday, 2=Tuesday,...7=Sunday). Type an X before the day number to deactivate the schedule period for that day. No more than seven entries are permitted on an input line. Press the return key to leave this schedule unchanged and move to the next prompt. (If not otherwise specified, a schedule period is assumed valid for all days.)
ALST	xxxx	Alternative list to be used for the schedule period. Respond with up to four alternative numbers in the order in which they are to be attempted. (These numbers are defined using ALT.)
DBK	Z Z Z Z	Alternatives for which “drop back busy” is to be active during this period. Respond with four entries of Y (allow) or N (deny) for the alternative evoked by the previous prompt. Responses are applied in sequence.
QUE	Z Z Z Z	Specifies alternatives for which queuing to a route is to be allowed during this period. Respond with four entries of Y (allow) or N (deny) for the alternatives evoked by ALST. Responses are applied in sequence. If the response is Y, off-hook queuing must already be configured for calls to be queued on this route.

LD 93 – Assign a NAS routing table to Console Presentation Groups.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	CPG	Console Presentation Group.
CUST	xx	Customer number.
CPG	1-63	Console Presentation Group number.
CPGS	(NO) YES	Customer Presentation Group Services.
ROUT	0-511	Route number.
TEN	1-511	Tenant number.
NTBL	(0) - 63	NAS routing table to be used for calls directed to this Attendant Console Group(ACG)/ Console Presentation Group (CPG).

LD 16 – Allow or deny pre-answer tromboning (allow or deny an incoming call to be directly routed back on the same route).

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	RDB	Route Data Block.
CUST	xx	Customer number.
ROUT	0-511	Route Number.
TKTP	aaa	Trunk Type requires response when REQ=NEW.
TRMB	(YES) NO	Tromboning. NO = Tromboning denied. Incoming trunk call on route may not be routed back on same route. YES = Tromboning allowed. Incoming trunk call on route may be routed back on the same route. Only applies to calls routed using NARS/BARS or CDP. Does not apply to calls redirected by Hunt, Forward All Calls, or Forward No Answer.

Note: The anti-tromboning capabilities programmed in LD 16 only apply to attendant extended calls.

NAS performs tromboning when required regardless of the LD 16 programming. However, if redundant (or tromboned) trunk connections are to drop after the telephone is answered, this prompt must be set to NO across the network where this might occur.

Example of NAS implementation

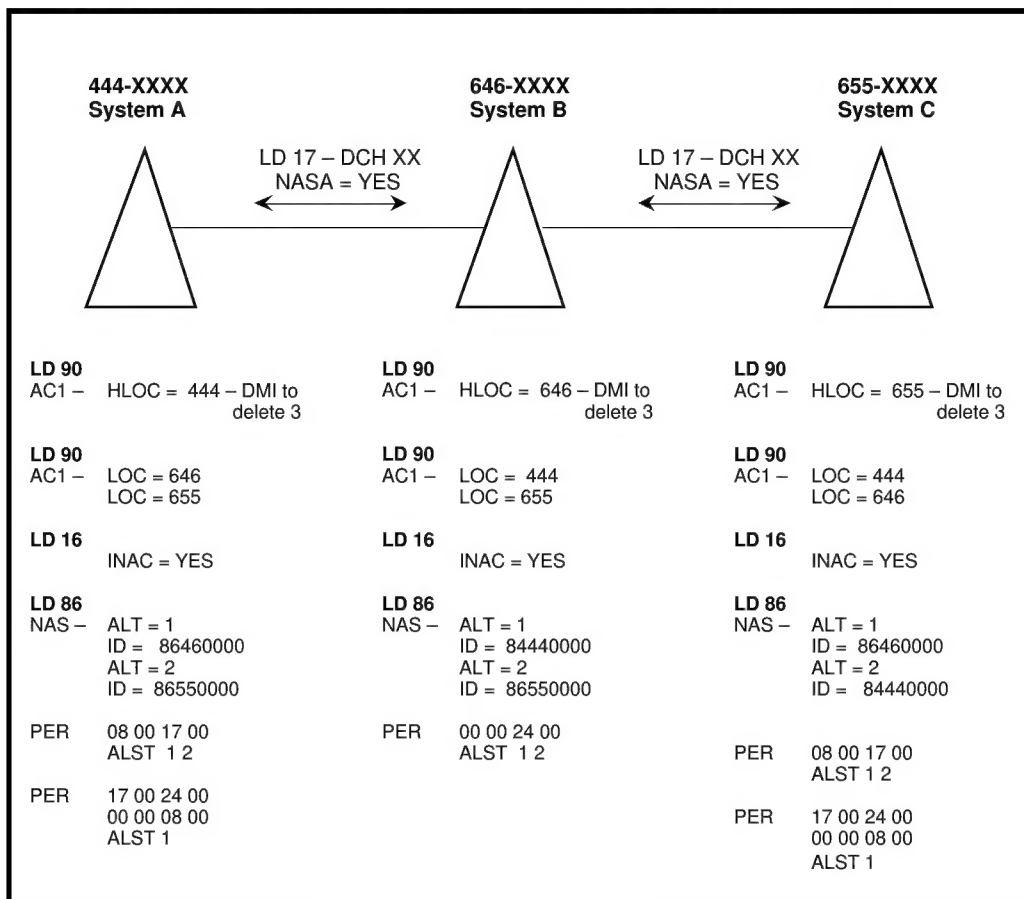
Figure 52 illustrates a simple application of the NAS functionality in a private ISDN PRI network connecting three Meridian 1 systems. Although this example uses NARS, the same functionality can be accomplished using CDP.

Each system has the translations in place for a HLOC and the two LOC codes for the other two Meridian 1 locations. This programming was done in the NARS database. The route lists required in order to process these types of calls have been programmed also.

The INAC implementation was part of the basic ISDN/Networking programming.

The NAS programming involves the configuration of the D-channel for NAS functionality, the ID of the other attendants to be used, a list of the sequence in which these attendants are to be scanned for availability and the time periods for each list.

System B, in this example, is the location where attendants should be available 24 hours a day. During the day, the other two locations are programmed to use System B as their first choice backup and then as a second choice System A uses System C and System C uses System A. At night, Systems A and C use System B as the only backup. If it is unavailable, calls will be given Night Service.

Figure 52**A simple application of NAS functionality in a private ISDN PRI network**

Feature operation

There are no operating procedures specified for this feature.